Watershed Approach to Recovering Urban Streams:
Developing and Implementing a Watershed Management Plan

STEVE HITCH, PE – CITY OF REDMOND

Puget Sound Salmon

Healthy aquatic habitat where people live and work is almost gone.
Stormwater Management

Development prior to 2013 is not equipped with sufficient stormwater controls.

The Dilemma

Washington Municipal Stormwater Permit
- Tied to new development and redevelopment
- Treatment designed to improve conditions relative to existing conditions
- New requirements for LID
- Does not specifically target areas of ecological importance

Hydrology

Hydrograph of stream flooding before and after urbanization of a watershed
Hydrology

Water Quality

Impacts of Stormwater Runoff on Coho Salmon in Restored Urban Streams, Sarah McCarthy
Accommodating Growth

Population Growth

Two more Seattle’s and two more Tacoma’s by 2040!

Vision 2040
Accommodate population growth in designated centers linked by transit:

- 29 Regional Growth Centers
  - 2.6% of total UGA (~26 sq mi)
  - Currently 30% of region’s jobs

- 8 Manufacturing/Industrial Centers
  - 3.7% of total UGA area
City of Redmond
- 17 Square Miles
- 60,000 residents
- 85,000 employed
- Built out in the 70's-90's
- Committed to Restoring Streams
- Rapid redevelopment in urban centers

Typical Urban Streams
- Erosion
- Incision
- Poor Water Quality
- Low Base Flows

Redmond Citywide Watershed Plan
Approved in February 2014

Goals
- Provide baseline of scientific information evaluating watershed rehabilitation potential
- Prioritize a subset of watersheds with greatest potential to respond to rehabilitation efforts
- Identify specific tools to rehabilitate highest priority watersheds by 2060

Redmond Citywide Watershed Plan
Approved in February 2014
Watershed Planning
Guiding Principles
- Address multiple regulations with
  one effort (TMDL, NPDES, ESA)
- Prevent NEW stormwater impacts
  everywhere
- Focus improvements to existing
  stormwater impacts where it makes
  sense (benefit)
- Create a citywide plan that
  addresses stormwater and
  environmental asset needs
- Make participation optional to
developers (and capital projects)

Elements of the Plan
- Build Partnerships – yes, even with
  Ecology
- Characterize Watersheds
- Set goals for future desired conditions
- Implementation Plan
- Performance Measurement
- Adaptive Management

Lots to Learn
- Topography
- Soil Types
- Stream Maps
- Land Use
- Wellhead Protection Zones
- Presence of stormwater facilities
- Water Quality data
- Fish presence
- B-IB Data
- Flow characteristics
Prioritizing Watersheds

Management Matrix for Restoration & Protection of Water Flow

Restoration Approach

1. Identify Priority Watersheds
   (Moderate impairment + highest rehabilitation potential)
2. City builds facilities to improve stream hydrology and water quality
3. Developers in other watersheds pay fee-in-lieu to reimburse City for facility costs
4. Key:
   - Don’t make anything worse
   - Allow for transfer of investments to highest priority watersheds

Room to Improve!

Inadequate Flow Control
Inadequate Treatment

Figure 3. Puget Sound Watershed Characterization Management Strategy Matrix.
Watershed Planning

Ecology created watershed characterization model
Covers all of western Washington
Aligns with Redmond's local analysis
Redmond Watershed Plan Implementation

Watershed Planning – How it Works

- City approval of watershed approach
- Develop a detailed plan for specific improvements by watershed
- New stormwater impacts will typically be addressed at or close to the site
- Improving existing impact can be moved to priority areas
- City projects can benefit

Watershed Planning How it Works (Continued)

- Tracking (accounting)
- Performance (outcome) monitoring is essential
- Funding strategy
- Have public support to invest in the environment
### Redmond Paired Watershed Study

**Experimental Design**

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- Water quality monitoring
  - 12 storm flow events annually
  - 4 base flow events annually
- Habitat monitoring
  - Annually
- Hydrologic monitoring
  - Continuous
- Sediment monitoring
  - Annually
- Biological monitoring
  - Annually

Questions?

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